

This listing of claims will replace all prior versions, and listings, of claims in the application:

Listing of Claims:

Claims 1-30 (Cancelled).

Claim 31 (New): A method of treating a metal surface, comprising the steps of:

- (a) providing a metal substrate; and
- (b) applying an aqueous solution to said metal substrate, said solution

comprising:

- (i) at least one acyloxy silane, wherein said acyloxy silane comprises at least one acyloxy group, and wherein said acyloxy silane has been at least partially hydrolysed and is either

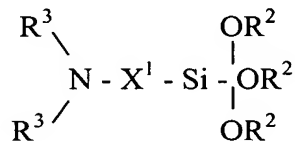
- (A) a single tetrasubstituted silicon atom wherein the substituents are individually selected from the group consisting of alkyl, alkenyl, alkynyl, aryl, alkaryl, aralkyl, vinyl, amino, ureido, glycidoxy, epoxy, hydroxy, alkoxy, aryloxy, acyloxy, and any of the group alkyl, alkenyl, alkynyl, aryl, alkaryl and aralkyl substituted by a group selected from the group consisting of vinyl, amine, ureido, glycidoxy, epoxy, hydroxy and alkoxy, with the proviso that at least one of the substituents on the silicon atom is an acyloxy group; or

- (B) a multisilyl acyloxy silane;

and

- (ii) at least one basic silane compound which is selected from the group consisting of

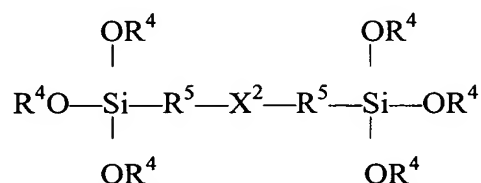
- (A) compounds having the general structure



wherein R^2 is chosen from the group consisting of hydrogen and $\text{C}_1\text{-C}_{24}$ alkyl, and each R^2 may be the same or different; X^1 is selected from the group consisting of a bond, substituted and unsubstituted aliphatic groups and substituted and unsubstituted aromatic groups; and

R³ is a group individually selected from the group consisting of hydrogen, C₁-C₆ alkyl, C₂-C₆ alkenyl, C₁-C₆ alkyl substituted with at least one amino group, C₂-C₆ alkenyl substituted with at least one amino group, arylene and alkylarylene; and

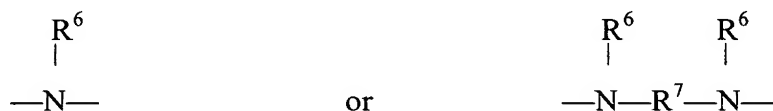
(B) a bis-silyl aminosilane(s) having the structure



wherein R⁴ is individually selected from the group consisting of: hydrogen and C₁ - C₂₄ alkyl;

R⁵ is individually selected from the group consisting of: substituted aliphatic groups, unsubstituted aliphatic groups, substituted aromatic groups, and unsubstituted aromatic groups; and

-X² is either:



wherein each R⁶ is individually selected from the group consisting of: hydrogen, substituted and unsubstituted aliphatic groups, and substituted and unsubstituted aromatic groups; and

R⁷ is selected from the group consisting of: substituted and unsubstituted aliphatic groups, and substituted and unsubstituted aromatic groups

wherein the acyloxy silane and the basic silane compound are present in concentrations to provide a solution pH of between 3 and 10 and wherein the solution is substantially free of acid other than acid produced upon hydrolysis of the acyloxy silane.

Claim 32 (New) The method of claim 31, wherein R² is C₁-C₆ alkyl.

Claim 33 (New): The method of claim 31, wherein the solution pH is between 4 and 8.

Claim 34 (New): The method of claim 31, wherein the solution pH is between 4 and 5.

Claim 35 (New): The method of claim 31, wherein the metal surface is selected from the group consisting of steel, aluminum, aluminum alloys, zinc, zinc alloys, magnesium, magnesium alloys, copper, copper alloys, tin and tin alloys.

Claim 36 (New): The method of claim 31, wherein the metal surface is selected from the group consisting of:

- a metal surface having a zinc-containing coating;
- zinc;
- zinc alloy;
- Aluminum;
- Aluminum alloy; and
- steel.

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Claim 37 (New): The method of claim 31, wherein the acyloxy silane comprises one silyl group.

Claim 38 (New): The method of claim 31, wherein the acyloxy silane comprises more than one silyl group.

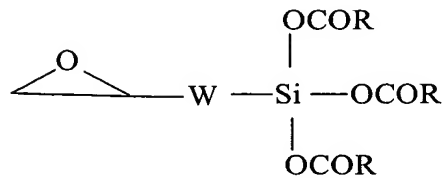
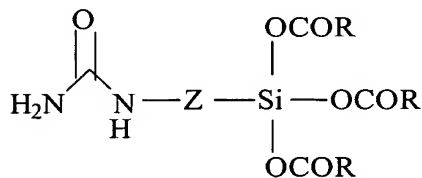
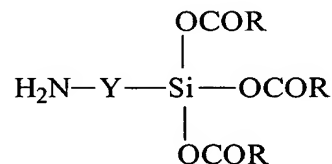
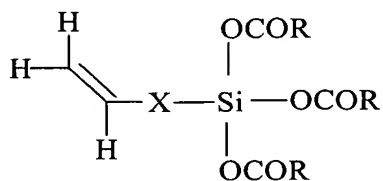
Claim 39 (New): The method of claim 31, wherein the acyloxy silane comprises two silyl groups.

Claim 40 (New): The method of claim 31, wherein each acyloxy group on the at least one acyloxy silane is the same and is selected from the group consisting of C₂₋₁₂ alkanoyloxy, C₃₋₁₂ alkenoyloxy, C₃₋₁₂ alkynoyloxy and C₇₋₁₈ arenoyloxy.

Claim 41 (New): The method of claim 40, wherein each acyloxy group is selected from the group consisting of C₂₋₆ alkanoyloxy, C₃₋₆ alkenoyloxy, C₃₋₆ alkynoyloxy and C₇₋₁₂ arenoyloxy.

Claim 42 (New): The method of claim 41, wherein each acyloxy group is ethanoyloxy or methanoyloxy group.

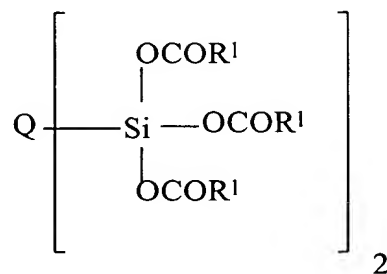
Claim 43 (New): The method of claim 31, wherein the acyloxy silane is selected from the group consisting of:



wherein W, X, Y and Z are selected from the group consisting of a C-Si bond, substituted aliphatic groups, unsubstituted aliphatic groups, substituted aromatic groups and unsubstituted aromatic groups; and R is selected from methyl, ethyl and propyl.

Claim 44 (New): The method of claim 43, wherein R is ethyl.

Claim 45 (New): The method of claim 38, wherein the acyloxy silane has the structure



wherein Q is selected from the group consisting of a bond, an aliphatic group and an aromatic group; and

R¹ is selected from methyl, ethyl and propyl.

Claim 46 (New): The method of claim 45, wherein Q is selected from the group consisting of a bond, C₁-C₆ alkylene, C₂-C₆ alkenylene, C₁-C₆ alkylene substituted with at least one amino group, C₂-C₆ alkenylene substituted with at least one amino group, C₁-C₆ alkylene substituted with at least one sulfide group containing 1 to 10 sulfur atoms, C₂-C₆ alkenylene substituted with at least one sulfide group containing 1 to 10 sulfur atoms, arylene and alkylarylene.

Claim 47 (New): The method of claim 46, wherein the acyloxy silane is selected from the group consisting of bis-(triacetoxysilyl)ethane, bis-(triacetoxysilylpropyl) amine and bis-(triacetoxysilylpropyl)tetrasulfide.

Claim 48 (New): The method of claim 31, wherein the acyloxy silane is vinyltriacetoxysilane.

Claim 49 (New): The method of claim 31, wherein R² is individually chosen from the group consisting of hydrogen, ethyl, methyl, propyl, iso-propyl, butyl, iso-butyl, sec-butyl and ter-butyl;

X¹ is selected from the group chosen from the group consisting of a bond, C₁-C₆ alkylene, C₂-C₆ alkenylene, C₁-C₆ alkylene substituted with at least one amino group, C₂-C₆ alkenylene substituted with at least one amino group, arylene and alkylarylene; and

R³ is individually selected from the group consisting of hydrogen, ethyl, methyl, propyl, isopropyl, butyl, iso-butyl, sec-butyl and ter-butyl.

Claim 50 (New): The method of claim 31, wherein the basic silane compounds are selected from the group consisting of γ -aminopropyltriethoxysilane and γ -aminopropyltrimethoxysilane, bis-(trimethoxysilylpropyl)amine, bis-(triethoxysilylpropyl)amine and bis-(triethoxysilylpropyl)ethylene diamine.

Claim 51 (New): The method of claim 31, wherein a polymer coating is applied to the treated metal substrate.

Claim 52 (New): The method of claim 51, wherein the polymer coating is selected from paints, adhesives, rubbers and plastics.

Claim 53 (New): The method of claim 31, wherein the solution contains at least 0.1% acyloxy silanes by volume.

Claim 54 (New): The method of claim 31, wherein the solution contains at least 1% acyloxy silanes by volume.

Claim 55 (New): The method of claim 31, wherein the solution contains between 2% and 5% by volume of acyloxy silanes.

Claim 56 (New): The method of claim 31, wherein the solution contains at least 0.1% basic silane compound by volume.

Claim 57 (New): The method of claim 31, wherein the solution contains at least 1% by volume of basic silane compound.

Claim 58 (New): The method of claim 31, wherein the solution contains between 2% and 5% of basic silane compound.

Claim 59 (New): An aqueous solution comprising an acyloxy silane and a basic silane compound of claim 31, wherein the acyloxysilane and the basic silane compound are present

in concentrations to provide a solution pH of between 3 and 10 and wherein the solution is substantially free of acid other than the acid produced upon hydrolysis of the acyloxy silane.

Claim 60 (New): The aqueous solution of claim 59, wherein the aqueous solution pH is between 4 and 8.

Claim 61 (New): The aqueous solution of claim 59, wherein the aqueous solution pH is between 4 and 5.

Claim 62 (New): The aqueous solution of claim 59, wherein the solution contains at least 0.1% acyloxy silanes by volume.

Claim 63 (New): The aqueous solution of claim 59, wherein the solution contains at least 1% acyloxy silanes by volume.

Claim 64 (New): The aqueous solution of claim 59, wherein the solution contains between 2% and 5% of acyloxy silanes by volume.

Claim 65 (New): The aqueous solution of claim 59, wherein the aqueous solution contains at least 0.1% basic silane compound by volume.

Claim 66 (New): The aqueous solution of claim 59, wherein the solution contains at least 1% by volume of basic silane compound.

Claim 67 (New): The aqueous solution of claim 59, wherein the solution contains between 2 and 10% by volume of basic silane compound.

Claim 68 (New): The aqueous solution of claim 59, wherein the solution contains between 2% and 5% by volume of basic silane compound.